REQUIREMENTS FOR DESIGN AND INSTALLATION OF HEATING SUBTATIONS

I. Design requirements for heating substations

1. Design guidelines and standards:

	Parameter	Standard
1	Heating substation connection diagram	Indirect
2	Determination of the heat load at the place of consumption	• EVS-EN 12831-1:2017 (Energy performance of buildings. Method for calculation of the design heat load- Part 1: Space heating load, Module M3-3)
3	Design of the heating system for the place of consumption	•EVS 844:2022 (Design of heating for buildings); •EVS-EN 12828:2012+A1:2014 (Heating systems in buildings- Design for water-based heating systems)
4	Design of a heating substation	• Estonian Power and Heat Association recommendation “Heating substations. Guidelines and rules”, TS1/2019
5	Design of the primary circuit of the piping system	• EVS-EN 10216-2:2013 (Seamless steel tubes for pressure purposes- Technical delivery conditions- Part 2: Non-alloy and alloy steel tubes with specified elevated temperature properties); • EVS-EN 10217-2:2019 (Welded steel tubes for pressure purposes- Technical delivery conditions- Part 2: Electric welded non-alloy and alloy steel tubes with specified elevated temperature properties) • EVS-EN 10217-5:2019 (Welded steel tubes for pressure purposes- Technical delivery conditions- Part 5: Submerged arc welded non-alloy and alloy steel tubes with specified elevated temperature properties)

2. In the case of heating substations with a capacity > 0.15 MW all the relevant characteristics of the heating substation must be capable of being connected to the remote management system via a data link, i.e. temperature sensors for both the circulation of domestic hot water and the return pipes of heating circuits (including radiator heating, floor heating, ventilation, etc.) and pressure sensors for heating circuits. The data connection capability may also be created with an additional module, provided that the additional module is located in the same electrical box.

3. In the case of heating substations with a domestic hot water capacity > 0.15 MW use automation unit which automatically reduces the consumption peaks for the building, i.e. reduces the consumption of heating circuits at times when the consumption of domestic hot water is high. AI-based controllers or accessories that enable peak consumption reduction are also allowed.

4. Design an automated heating substation with an indirect connection to the building. A two-stage heat exchanger may be used in the case of domestic hot water capacity > 0.15 MW and with heating circuit’sflow temperature ≤ 70 °C.

5. The primary side of the heating substation must be of steel P235. The wall thickness of the pipes and pipe elements used (elbows, branchings, transitions, etc.) must not be less than that defined by EVS-EN 253.

6. The choice of material for the consumer installation is based on a maximum temperature of 130 °C and a pressure of 1.6 MPa.

7. In the case of large pressure differentials on the primary side of the heating substation, a differential pressure regulator on the primary side must be used to provide a constant pressure drop for the heating substation in the event of variations in the pressure of the network water and the heat loads of the consumer side.

8. The selection and installation of equipment must prevent noise from occurring above the norms permitted by legislation.

9. If the secondary circuit is filled with water from the district heating return line, it must be carried out through the filling meter. If necessary, design a filling pump for the heating system.

10. If no uninterrupted power supply system is planned at the point of consumption, a connection point should be provided in the substation electrical box or near it, to enable the heating substation to be connected to an external power supply. Add the corresponding marking to the diagram and box. Under normal circumstances, connection point must not be electrically powered. When switching the heating substation to the external power supply, it must be possible to separate the heating substation from the general electrical system of the building.

11. Prepare for the installation of the remote reading device and the provision of uninterrupted power supply for the remote reading system, designing an electrical and automation panel circuit with automatic protection size C2A. Add the corresponding marking to the diagram and shield.

12. When constructing a heating substation, ensure high-quality mobile communication transmission (GPRS/2G/4G with 800 MHz frequency) by Telia Eesti AS for the remote reading device at the location of the measuring point. If the design of the place of consumption prevents the mobile communication of the remote reading device, it must be possible to install the remote reading device and its cable on the higher floors of the building or outside the building.

13. In addition to the recommendations of the Estonian Power and Heat Association, the heating substation dimensioning sheet must include the manufacturers and models of the controller and actuators, as well as of accessories installed in the control system of the heating substation.

14. The long-term goal of the district heating network is to lower the flow and return temperatures, which has a positive impact on the efficiency of heat production, reduces heat losses in the district heating network and allows for the use of low-temperature heat sources. New and substantially renovated buildings must be with the readiness to work on lowered network temperatures. Consequently, when designing heat exchangers and heating systems, take into account the minimum requirements set out in the following table:

Calculated temperatures		**Primary side**		**Secondary side**	
	Building	Initial temperature, °C	Final temperature, °C	Initial temperature, °C	Final temperature, °C
	Heating system	Entering	Outgoing	Entering	Outgoing
Domestic hot water exchangers	All buildings	60	≤ 25	≥ 8	55
Heat exchangers*	New buildings	80	≤ 43	≤ 40	≤ 60
	Major renovations, including heating system	80	≤ 43	≤ 40	≤ 60
	Existing houses, old cast iron radiators	85	≤ 63	≤ 60	≤ 80
*Selecting the secondary side ventilation graph based on current standards		At design outdoor temperature	Maximum 3 °C higher than the initial secondary temperature	Freely selectable within the indicated limits	

15. When choosing the minimum guaranteed pressure difference, be guided by the table below:

Region	Minimum guaranteed pressure differential, MPa
Tallinn**, Maardu, Jõgeva	0,10
Keila	0,08
Rapla	0,07
Haapsalu, Valga	0,06
Kärdla	0,05
Paide	0,08

**In the case of district heating networks supplied by a local boiler house or boiler plant, which are not connected to the single district heating network in Tallinn, take from the minimum guaranteed pressure differential of Haapsalu and Valga as the reference.

II. General requirements for the installation of a heating substations

1. Before installing a heating substation, submit the design and passport of the heating substation to the heating undertaking for approval (the passport consists of a heating substation dimensioning sheet with a list of equipment, a diagram of the heating substation and the layout of the heating substation).

2. When choosing and installing the heating substation, access should be ensured for maintenance of the unit and installation of the thermal energy meter on the primary return pipeline (a straight pipe section of 80-100 cm must be prepared) and the possibility of later maintenance (assembly/demonstration). The height of the thermal energy meter from the floor must be between 400 mm and 1 200 mm, at least 120 mm from the wall. Install the thermal energy meter in such a way as to prevent water from entering the housing and calculation unit in the future and above joints, sludge collectors, flanges, etc.

3. When installing a heating substation, welding works must be carried out by a welder holding the appropriate certificate of competence. When connecting to the primary side of the heat pipeline, the requirements of the heating undertaking, which are laid down in the general technical conditions for the design of the heating pipeline, must be complied with.

4. Electrical connections to a heating substation must be carried out by an electrician qualified in accordance with the installation and safety requirements established by legislation.

5. The thermal energy meter must be installed by the heating undertaking unless otherwise agreed. The thermal energy meter and remote reading equipment must be installed after the heating substation is connected to the district heating pipeline and after the switchboard of the heating substation is connected to the electricity supply. The installation instructions drawn up by the manufacturer of the equipment must be complied with when installing the thermal energy meter.

6. After installing a heating substation and a thermal energy and filling meter, carry out a pressure test of the heating substation in the presence of a representative of the heating undertaking. The pressure test is carried out with cooled water at a pressure of 10 bar (1 MPa) for 15 minutes.

7. After the pressure test, cover the pipes with anti-corrosion paint and insulate.